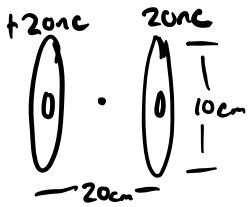
P: 12 & 14
CQ: 7 & 8

26.P.12



a.) E_{mid}: $E_{ring} = \frac{kzQ}{(z^2+R^2)^{3/2}}$ $\quad E_{mid} = 0\ N/C$

$z = 10\times10^{-2}\ m$
$R = 5.0\times10^{-2}\ m$
$Q = 20\times10^{-9}\ C$
$k = 8.99\times10^{9}\ \frac{Nm^2}{C^2}$

$E_{1r} = 12{,}865.4\ N/C$
$E_{2r} = -12{,}865.4\ N/C$

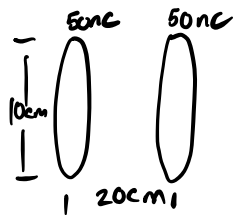
$E_1 + E_2 = 0\ N/C$

$E_M = 0\ N/C$
$E_C = 4.1\times10^{3}\ N/C$

b.) E_L: $E_L = 4.1\times10^{3}\ N/C$

$z = 20\times10^{-2}\ m$
$R = 5.0\times10^{-2}\ m$
$Q = 20\times10^{-9}\ C$
$k = 8.99\times10^{9}\ \frac{Nm^2}{C^2}$

26.P.14



a.) $\vec{E} = 0$ due to symmetry

b.) E_5: $E_D = \frac{\eta}{2\epsilon_0}\left[1 - \frac{z}{\sqrt{z^2+R^2}}\right]$

$E_N = 8.7\times10^{4}\ N/C$
$E_{mid} = 0\ N/C$

E_{15}:

$\eta = \frac{Q}{A} = \frac{50\times10^{-9}\ C}{\pi(5.0\times10^{-2}\ m)^2}$

$\epsilon_0 = 8.85\times10^{-12}\ \frac{C^2}{Nm^2}$

$z = 15\times10^{-2}\ m$

$R = 5.0\times10^{-2}\ m$

$E_{15} = 1.84\times10^{3}\ N/C$

$E_5 = 1.1\times10^{4}\ N/C$

E_5:

$\eta = \frac{Q}{A} = \frac{50\times10^{-9}\ C}{\pi(5.0\times10^{-2}\ m)^2}$

$\epsilon_0 = 8.85\times10^{-12}\ \frac{C^2}{Nm^2}$

$z = 5.0\times10^{-2}\ m$

$R = 5.0\times10^{-2}\ m$

$E_N = E_5 - E_{15} = 86888.4\ N/C$

26.CQ.12 $E_{cap} = \frac{\eta}{\epsilon_0} = \frac{\frac{Q}{A}}{\epsilon_0} = \frac{Q}{A\epsilon_0} = \frac{Q}{L^2\epsilon_0}$

a.) Q doubled, E is doubled

b.) L doubled, E is $\frac{1}{4}$'d

c.) no dependence on d $E = E$

26.CQ.14 $F = qE$

a.) $E = \frac{\eta}{\epsilon_0}$ $\eta = \frac{Q}{A}$ $F_p = F_e$ due to charge of the particle not having an effect on the magnitude of the force

b.) $F = ma$ $a = \frac{F}{m}$ $F_p < F_e$ due to a proton being more massive